Financial Development and Poverty Alleviation: Time Series Evidence from Pakistan

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Abstract: Poverty is one of the major macroeconomic problems of Pakistan. This study was conducted with the purpose to prescribe some policy measures to alleviate poverty in Pakistan. Time series data was used to examine causal relationship between financial deepening and poverty alleviation for the period 1981-2010. Broad money supply (M2/GDP), domestic credit to the private sector (DCP/GDP) and domestic money bank assets (DMBA) are used as proxies for financial development and private per capita consumption as proxy for poverty reduction in this study. A newly developed autoregressive distributed lag-bounds testing procedure (ARDL) was used to examine the long-run relationship between financial development and poverty alleviation and concluded that financial deepening (broad money supply and domestic credit to private sector) have long-run relationship with per capita consumption (poverty alleviation). On the other hand, domestic money bank assets have no long-run relationship with poverty alleviation. Results of Error Correction Mechanism (ECM) show the existence of both short-run and long-run relation between private per capita consumption and ratio of broad money supply to GDP (M2/GDP). Domestic credit to private sector GDP (DCP/GDP) is positively correlated with private per capita consumption. The study also found positive relation of domestic money bank assets (DMBA) with per capita consumption. It concludes that financial deepening reduces poverty. Microfinance has served as an important tool of poverty reduction. It should be intensified in rural areas. It is also essential to control the development of financial intermediaries as financial crises are especially detrimental to the poor sector.

Key words: Poverty · financial development · ARDL · Pakistan

INTRODUCTION

Financial deepening is an engine of economic prosperity. The main role of financial development is to improve the living standard of the people. Sound finance is necessary to open investment opportunities as higher level of savings are associated with high incomes which will further lead to poverty alleviation. Finance plays main role in development process as the ultimate fruit of sound finance is economic growth [1].

Poverty can't be defined precisely. Generally, a family suffers from poverty when it is unable to satisfy its necessities with its income constraints. In other words; poverty is a situation when basic needs exceed the available means to satisfy these desires. The main cause of economic backwardness is poverty. Poverty is predominantly rural in Pakistan. According to an estimate, sixty-two million people in Pakistan are financially weak and majority of them are belong to rural areas. Poverty alleviation is an important policy goal for Pakistan [2].

Financial development and its effects on economic growth have gained much more attention in recent studies but minor work has been done on such issues. Even most of the studies in this regard still have limitations. Some researchers claim that financial deepening will improve the allocation of capital, having positive impact on the poor. Others are of the opinion that rich take more benefits from financial system improvements. As lack of finance is one of the main reasons of persistent poverty [3].

Poverty alleviation through financial development is a broad issue but limited work has been conducted to uncover the relation between financial deepening and poverty alleviation [4-11]. Even those countries where such studies have been examined, the results as well as the procedure through which financial deepening leaves affect on the poor sector have been unpredictable [12].

Financial deepening affects economic growth and it can be helpful in alleviating poverty because economic growth leads to poverty alleviation. Strong finance is termed as a vehicle to accelerate investment

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and economic growth, which is help full for poverty alleviation. The planed finance improves the potential of financial system o take part in the economic progress and then in poverty alleviation. Shifting of productive funds from surplus units to deficit units will hold tight link between financial deepening and poverty alleviation [13].

MATERIALS AND METHODS

The data: The link between financial development and poverty reduction will be analysed by time series data of Pakistan's economy for the period 1981-2010.This study uses three variables of financial development, namely broad money supply as a ratio of gross domestic product (M2/GDP), domestic credit to the private sector as a ratio of gross domestic product (DCP/GDP) and domestic money bank assets (DMBA) and private per capita consumption (PCC), as proxy for poverty reduction.

Domestic Credit to Private Sector (DCP/GDP): Domestic Credit to Private Sector is the ratio of banks claim on the private sector to GDP (DCP/GDP). It shows the role played by financial sector in economy.

Broad Money Supply (M2/GDP): Broad Money Supply can be defined as the ratio of broad money M2 to GDP. It indicates the real sector of the financial sector of a growing economy.

Domestic Money Bank Assets (DMBA): Domestic Money Bank Assets (DMBA) is the ratio of commercial bank assets to the sum of commercial bank assets and central bank assets of an economy.

Private per capita consumption: Private per capita consumption is the ratio of household final Consumption expenditure (in constant 2000 US dollars) to the total population. Private Per capita consumption is used to indicate the living standard of the people.

Unit root tests: Unit root tests are used to check whether the variables are stationary or not. Data is said to be stationary if its mean value is zero and covariance remains constant over time. Unit root tests included Augmented Dickey Fuller Test (ADF) and Phillips-Perron Test (PP).
Consider the following AR (1) model

$$Y_t = \phi Y_{t-1} + \varepsilon_t \qquad (1)$$

The stationary condition is $\sigma < 1$.

Case 1: $\sigma < 1$ therefore the data is stationary.

Case 2: $\sigma > 1$ where in this case the series explodes.

Case 3: $\sigma = 1$ where in this case the series contains the unit root and is non-stationary.
The paper uses both Augmented Dickey-Fuller Test (ADF) and Phillips-Perron tests to examine the data set for stationary.

Augmented Dickey-Fuller Test (ADF): Augmented Dickey-Fuller Test (ADF) is the expansion of Dickey-Fuller Test. It is used for higher order lags of the dependent variable to eliminate the autocorrelation. The lag length on these extra terms is either determines by Akaik Information Criterion (ACK) or by Schwartz Bayesian Criterion (SBC) [14, 15].
The three possible forms of ADF test are given by the following equations.

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \mu_t \qquad (2)$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \mu_t \qquad (3)$$

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \alpha_{2t} + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \mu_t \qquad (4)$$

The difference between the three regressions again concern the presence of the deterministic elements α_0 and α_2.

Philips-perron test: Just like the Augmented Dickey Fuller Test (ADF), the Phillips-Perron test addresses the issue that data of X_t and Y_t may be high order autocorrelation as equation X_{t-1} and Y_{t-1}. Phillips-Perron test shows a non-parametric test statistics. To test whether relationship among variables is of long run nature or of short run, co-integration test will be applied [16].

Autoregressive Distributed Lag (ARDL) approach: Recently developedAutoregressive Distributed Lag (ARDL) Model is applying to check a long-run relation among variables, presented by [17]. Consider a very simple dynamic ARDL model describing the behaviour of Y in terms of X as follows:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \gamma_0 X_t + \gamma_1 X_{t-1} + \mu_t \qquad (5)$$

where Y_t and X_t are stationary variables and μ is a white noise.
And residual $\mu_t \sim (0, \sigma^2)$

In this model the parameter γ_0 denotes the short-run reaction of Y_t after a change in X_t. The long-run effect is given when the model is in equilibrium. Where

$$Y_t^* = Y_t = Y_{t-1} = ... = Y_{t-p} \qquad (6)$$

$$X_t^* = X_t = X_{t-1} = ... = X_{t-p} \qquad (7)$$

Thus it is given by:

$$Y_t^* = \alpha_0 + \alpha_1 Y_t^* + \gamma_0 X_t^* + \gamma_1 X_t^* + \mu_t$$

$$Y_t^* = (1 - \alpha_0) + \alpha_0 + X_t^*(\gamma_0 + \gamma_1) + \mu_t$$

$$Y_t^* = (1 - \alpha_1) = \alpha_0 + X_t^*(\gamma_0 + \gamma_1) + \mu_t$$

$$Y_t^* = \alpha_0 / 1 - \alpha_1 + X_t^* \gamma_0 + \gamma_1 / 1 - \alpha_1 + \mu_t$$

$$Y_t^* = \beta_0 + \beta_1 X_t^* + \mu_t \qquad (8)$$

So the long run elasticity between Y_t and X_t is captured by $\beta_1 = \gamma_0 + \gamma_1 / 1 - \alpha_1$

However ARDL in the study will be analyzed by taking following models:

Model 1-M2/GDP and Private Per Capita Consumption:

$$\Delta lnPCC_t - P_0 + \sum_{i=1}^{n} \emptyset_{1i} \Delta lnPCC_{t-i} + \sum_{i=0}^{1} \emptyset_{2i} \Delta lnM_2/GDP_{t-i} + \emptyset_3 lnPCC_{t-1} + \emptyset_4 lnM_2/GDP_{t-1} + \mu_t \qquad (9)$$

Model 2-DCP/GDP and Private Per Capita Consumption:

$$\Delta lnPCC_t - \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta lnPCC_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta ln \, DCP/GDP_{t-i} + \alpha_3 lnPCC_{t-1} + \emptyset_4 lnDCP/GDP_{t-1} + \mu_t \qquad (10)$$

Model 3-DMBA and Private Per Capita Consumption:

$$\Delta lnPCC_t - \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta lnPCC_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta ln \, DMBA_{t-i} + \alpha_3 lnPCC_{t-1} + \emptyset_4 lnDMBA_{t-1} + \mu_t \qquad (11)$$

Where

ln PCC = Log of private per capita consumption (in US $).
ln DCP/GDP = Log of ratio of domestic credit to private sector to GDP
ln M2/GDP = Log of ratio of broad money supply to GDP
ln DMBA = Log of domestic money bank asset
μ_t = White noise error term
Δ = First difference

Error Correction Model (ECM): Error Correction Model is a convenient method of measuring correction from disequilibrium of the previous period. Moreover disequilibrium error term is stationary variable [18].

Using the Vector Auto-regression (VAR) method, we can estimate the ECM: Model: l-Broad Money Supply (M2/GDP) and Private Per Capita Consumption:

$$\Delta lnPCC_t = \theta_0 + \sum_{i=1}^{n} \theta_{1i} \Delta lnPCC_{t-i} + \sum_{i=0}^{n} \theta2_i \Delta lnM2/GDP_{t-i} + ECM_{t-1} + \mu_t \qquad (12)$$

Model: 2-Domestic Credit to Private Sector (DCP/GDP) and Private Per Capita Consumption:

$$\Delta lnPCC_t - \theta_0 + \sum_{i=1}^{n} lnPCC_{t-i} + \sum_{i=0}^{n} \theta_{2i} lnDCP/GDP_{t-i} + ECM_{t-1} + \mu_t \qquad (13)$$

Model: 3-Domestic Money Bank Assets (DMBA) and Private Per Capita Consumption:

$$\Delta lnPCC_t - \theta_0 + \sum_{i=1}^{n} \theta_{1i} \Delta lnPCC_{t-i} + \sum_{i=0}^{n} \theta2_i \Delta lnDMBA_{t-i} + ECM_{t-1} + \mu_t \qquad (14)$$

Where

ECM_{t-1} = Lag error correction term obtained from the long run equilibrium relationship.

Table 1: Results obtained from unit root tests

Variables	Augmented dickey-fuller test		Philips-perron test		Lag Length determination	Conclusion
	Intercept	Intercept & trend	Intercept	Intercept & trend		
LM2/GDP	-3.516485	-3.69883	-2.635053	-4.482799	1	I(1)
	-0.015	-0.046	-0.0977	-0.3334		
ΔLM2/GDP	-4.372068	-4.334471	-4.224945	-4.257528		
	(0.0020)*	(0.0101)*	(0.0027)*	(0.0116)*		
LDCP/GDP	-2.9896265	-2.57583	-2.369085	-2.261394	1	I(1)
	-0.0482	-0.1903	-0.1588	-0.4403		
ΔLDCP/GDP	-3.261311	-3.18895	-4.043057	-4.044976		
	(0.0272)*	(0.1077)*	(0.0043)*	-0.0187		
LPPCC	-3.611165	-2.857583	-2.829308	-6.400715	1	I(1)
	-0.012	(-0.1903)	-0.0666	-0.0001		
ΔLPPCC	-4.007089	-4.845081	-0.698159	-6.408841		
	-0.0048	-0.003	-0.0001	-0.0001		
LDMBA	-0.660566	-2.166818	-2.240052	-2.240052	1	I(1)
	-0.8409	-0.4885	-0.0001	-0.4512		
ΔLDMBA	-4.234433	-4.269285	-5.768511	-5.742036		
	(-0.0028)	-0.0117	-0.0001	-0.0003		

Figures without parenthesis show t-statistics and in parenthesis are p-values

*Represents the stationarity of variables at first difference i.e. I(1)

Table 2: Results obtained from Augmented Auto Regressive Lag Model (ARDL)

Models	Test Statistics F-Statistics	Lag	Significance Level	Bound Critical Values* (restricted intercept and no Trend)		Bound Critical Values* (restricted intercept and Trend)	
1	4.996	1		I(0)	I(1)	I(0)	I(1)
2	3.642						
3	3.457		1%	4.614	5.966	5.333	7.063
			5%	3.272	4.306	3.71	5.018
			10%	2.676	3.586	3.008	4.15

Note: Bound critical values based on [19]

RESULTS AND DISCUSSION

Unit root test: Results of unit root tests are given in Table 1. The variables are checked by applying Augmented Dickey-Fuller (ADF) and Phillips-perron (PP) for the purpose of stationarity properties. All of the taken variables are tested first at intercept and then at trend & intercept, which show that LM2/GDP, LDCP/GDP, LPCC and LDMBA are stationary at first difference i.e. I (1).

Autoregressive Distributive Lag Model (ARDL): ARDL is used to check the long-run relation of variables. ARDL Test results are stronger than Unit Root Tests results. ARDL test is applicable to data only when variables are integrated at level i.e. I(0) or integrated at first difference i.e. I(1), or combination of both I(0) & I(1).

The computed F-statistics of co-integration is presented in Table 2. Conclusion depends on F-statistics. Consider the F-statistics of Model-1, where the value of computed F-statistics (4.996) exceeds the upper bound critical value (4.306), with no trend at 5% level of significance but just higher than F-statistics with trend (4.105) at 10% level of significance. This implies that null hypothesis cannot be rejected or in other words null hypothesis of co-integration will be accepted at 5% as well at 10% significance level and indication of co-integration relationship exists. Taking the Model-2 computed F-value (3.642) is greater than critical bound value with no trend (3.58) at 10%, which shows that there is evidence of long-run relation between variables of Model-2. Same can be apply to Model-3 where computed value of F-statistics (3.457) give less value as compare to upper critical values with trend and with no trend. Therefore, the null hypothesis

Table 3: Results obtained from error correction model

Dependent variable: d (ln (PCC)) t

Independent variables	Coefficient	t-statistics
Constant of Model-1	-0.003968	-0.809169
Constant of Model-2	-0.001103	-0.204310
Constant of Model-3	-0.000765	-0.000765
D(ln(PCC))t -1 of Model-1	-0.273332	-2.014470
D(ln(PCC))t -1 of Model-2	1.074224	2.782916
D(ln(PCC))t -1 of Model-3	1.020232	2.990328
D(ln(M2/GDP))t	0.274714	2.511240(0.01)
D(ln(M2/GDP))t -1	-0.273332	-2.014470(0.05)
D(ln(DCP/GDP))t	0.176713	1.858826(0.075)
D(ln(DCP/GDP))t -1	-0.104354	-0.870790(0.39)
D(ln(DMBA))t	0.013433	0.538316(0.59)
D(ln(DMBA))t -1	-0.034500	-1.338818(0.193)
ECT t-1 of D(ln(M2/GDP))t -1	-1.797308	-4.494097(0.0002)
ECT t-1 of D(ln(DCP/GDP))t -1	-1.521624	-3.492165(0.002)
ECT t-1 of D(ln(DMBA))t -1	-1.507303	-3.953943(0.0006)
R-Square of Model-1	0.527575	
R-Square of Model-2	0.447813	
R-Square of Model-3	0.439682	

***P-values are presented in parentheses

Table 4: Results obtained from diagnostics tests:

Variables	Serial Correlation LM Test:	Jarque-Bera Statistics	Hetroscedasticity Test:
M2/GDP	0.90(0.34)	0.39(1.83)	0.82(0.37)
DCP/GDP	0.47(0.95)	0.61(0.97)	0.58(0.72)
DMBA	0.89(0.36)	0.92(0.15)	0.59(0.70)

Note: t-statistics are in parentheses

It is evident from the above Table 4 that there is no econometric problem

can be rejected in case of Model-3 due to instability in banking sector as there occurred rapid process of privatization and nationalization of banks in Pakistan.

Error Correction Model (ECM): In case of Error Correction Model, both long-run and short-run information are included. It has advantage of moving from general to particular approach with disequilibrium error term which is stationary, according to previous studies [18]. The findings of Error Correction Model are shown in Table 3. All of the variables have expected sign and are significant. DMBA is considered an important indicator by [20] as well as in [21]. Negative sign of coefficient is link to Keynesian point of view that increase in money supply (M2) will pursue the idea of increased consumption expenditure (PPC) which is applicable in short run only.

Diagnostic tests: Diagnostic tests are applied to check that estimation give support to the idea of no econometric problem. These include Breusch-Godfrey serial correlation LM test [22], White Hetroskedesticity [23] and Jarque-Bera statistics [24]. On the basis of these tests, it can be concluded that there is no evidence of such econometric problems. In order to check error term Jarque-Bera test is applied and errors are normally distributed.

CONCLUSION AND RECOMMENDATIONS

This study has examined the role of financial deepening on poverty alleviation using time series data for Pakistan. Results based on autoregressive distributed lag model (ARDL) concluded that financial deepening (broad money supply and domestic credit to private sector) have long-run relationship with per capita consumption (poverty alleviation). On the other hand domestic money bank assets (DMBA) have no long-run relationship with poverty alleviation. Based on Error Correction Model, broad money supply and domestic credit to private sector are positively correlated and have short-run relationship with per capita consumption (poverty alleviation). Based on research findings, following policy recommendations are forwarded to reduce poverty effectively:

i.   Microfinance has served as an important tool of poverty alleviation. It needs to be intensified in rural areas to needy people.
ii. The procedure of the microcredit program should be made as simple as possible to widen the scope and range of it.
iii. There should be proper and specific training programs for the loony's so that judicious and effective use of credit could be made to achieve the objectives.
iv. For the proper training, follow up and speedy processing of the microcredit cases it is necessary to have an efficient and technically sound staff in appropriate number.
v.   It is important to control the development of financial intermediaries as financial crises are especially detrimental to the poor sector.
vi. There is an urgent need to sustain a higher level of macroeconomic stability in Pakistan in order to reduce high incidence of non performing credits to ensure that private sector credits are channeled to the real sector of the economy, enhance the level of corporate governance in the financial system and also strengthen risk management in the financial system.

vii. A related suggestion is that government borrowing through the sale of treasury bills should be minimized as it has not encouraged savings mobilization to financial institutions.

viii. The positive impact of financial development on poverty reduction is dampened or even cancelled out due to financial instability; the policy makers should consider the negative effect of financial instability.

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